SIEMENS

SIMATIC

S7-1500

Digital input module DI 16x24VDC HF (6ES7521-1BH00-0AB0)

Manual

Edition 07/2014

Answers for industry.

SIEMENS

SIMATIC

S7-1500/ET 200MP DI 16x24VDC HF Digital Input Module (6ES7521-1BH00-0AB0)

Manual

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07/2014

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Preface

Purpose of the documentation

This manual supplements the system manuals:

- S7-1500 Automation System
- ET 200MP Distributed I/O System

Functions that relate in general to the systems are described in these system manuals.

The information provided in this manual and in the system/function manuals supports you in commissioning the systems.

Changes compared to previous version

Changes described in this manual, compared to the previous version:

- Module integrated in hardware catalog STEP 7 (TIA Portal) V13, Update 3 or higher with the functions:
  - Module-internal shared input (MSI) for Shared Device
  - Configurable submodules, e.g., for Shared Device
- Appendix Open Source Software amended

Conventions

The term "CPU" is used in this manual both for the CPUs of the S7-1500 automation system, as well as for interface modules of the ET 200MP distributed I/O system.

Please also observe notes marked as follows:

Note

A note contains important information regarding the product described in the documentation or its handling, or draws special attention to a section of the documentation.

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For legal reasons, we are obliged to publish the original text of the license conditions and copyright notices. Please read the information relating to this in the appendix.

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Documentation guide

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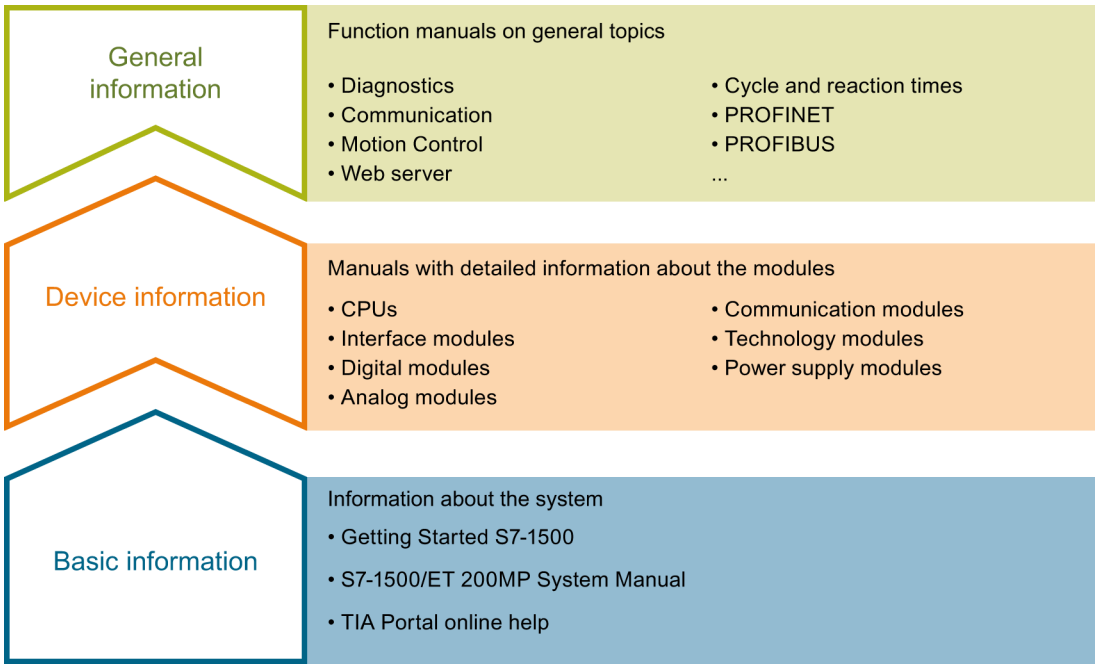
The documentation for the SIMATIC S7-1500 automation system and the SIMATIC ET 200MP distributed I/O system is arranged into three areas.
This arrangement enables you to access the specific content you require.



Basic information

System Manual and Getting Started describe in detail the configuration, installation, wiring and commissioning of the SIMATIC S7-1500 and ET 200MP systems. The STEP 7 online help supports you in the configuration and programming.

Device information

Manuals contain a compact description of the module-specific information, such as properties, terminal diagrams, characteristics, technical specifications.

General information

The function manuals contain detailed descriptions on general topics regarding the SIMATIC S7-1500 and ET 200MP systems, e.g. diagnostics, communication, Motion Control, Web server.

You can download the documentation free of charge from the Internet (http://www.automation.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/tech-doc-controllers/Pages/Default.aspx).

Changes and supplements to the manuals are documented in a Product Information.

Manual Collection S7-1500 / ET 200MP

The Manual Collection contains the complete documentation on the SIMATIC S7-1500 automation system and the ET 200MP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet (http://support.automation.siemens.com/WW/view/en/86140384).

My Documentation Manager

The My Documentation Manager is used to combine entire manuals or only parts of these to your own manual.
You can export the manual as PDF file or in a format that can be edited later.

You can find the My Documentation Manager on the Internet (http://support.automation.siemens.com/WW/view/en/38715968).

Applications & Tools

Applications & Tools supports you with various tools and examples for solving your automation tasks. Solutions are shown in interplay with multiple components in the system - separated from the focus in individual products.

You can find Applications & Tools on the Internet (http://support.automation.siemens.com/WW/view/en/20208582).

CAx Download Manager

The CAx Download Manager is used to access the current product data for your CAx or CAe systems.

You configure your own download package with a few clicks.

In doing so you can select:

- Product images, 2D dimension drawings, 3D models, internal circuit diagrams, EPLAN macro files
- Manuals, characteristics, operating manuals, certificates
- Product master data

You can find the CAx Download Manager on the Internet (http://support.automation.siemens.com/WW/view/en/42455541).

Product overview

2

2.1 Properties

Article number:

6ES7521-1BH00-0AB0

View of the module

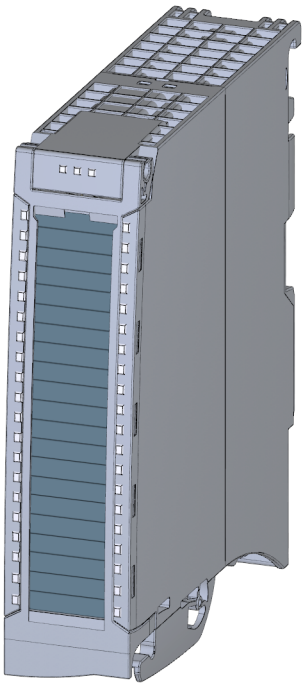


Figure 2-1 View of the DI 16x24VDC HF module

Properties

The module has the following technical properties:

- 16 digital inputs; electrically isolated in groups of 16
- Rated input voltage 24 V DC
- Configurable input delay: 0.05 ms to 20 ms
- Configurable diagnostics (per channel)
- Configurable hardware interrupt (per channel)
- Suitable for switches and 2-/3-/4-wire proximity switches

The module supports the following functions:

Table 2- 1 Version dependencies of the module functions

Function	Firmware version of the module	Configuration software	
		STEP 7 (TIA Portal)	GSD file in STEP 7 (TIA Portal) V12 or higher, or STEP 7 V5.5 SP3 or higher
Firmware update	V1.0.0 or higher	V12 or higher	X
Identification data I&M0 to I&M3	V1.0.0 or higher	V12 or higher	X
Parameter assignment in RUN	V1.0.0 or higher	V12 or higher	X
Isochronous mode	V1.0.0 or higher	V12 or higher	---
Module-internal Shared Input (MSI)	V2.0.0 or higher	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)
Configurable submodules / submodules for Shared Device	V2.0.0 or higher	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)
Configurable after interface module IM 155-5 DP ST	V2.0.0 or higher	V13 or higher	X

You can configure the module with STEP 7 (TIA Portal) and with a GSD file.

Accessories

The following accessories are supplied with the module and can also be ordered separately as spare parts:

- Labeling strips
- U connector
- Universal front door

Other components

The following component must be ordered separately:

Front connectors, including potential jumpers and cable ties

You can find more information on accessories in the S7-1500 Automation System (http://support.automation.siemens.com/WW/view/en/59191792) system manual and the ET 200MP Distributed I/O System (http://support.automation.siemens.com/WW/view/en/59193214) system manual.

Wiring

3

This section contains the block diagram of the module and outlines various connection options.

For more information on front connector wiring and creating cable shields, for example, refer to the "Wiring" section in the S7-1500 Automation System (http://support.automation.siemens.com/WW/view/en/59191792) and ET 200MP distributed I/O system (http://support.automation.siemens.com/WW/view/en/59193214) system manuals.

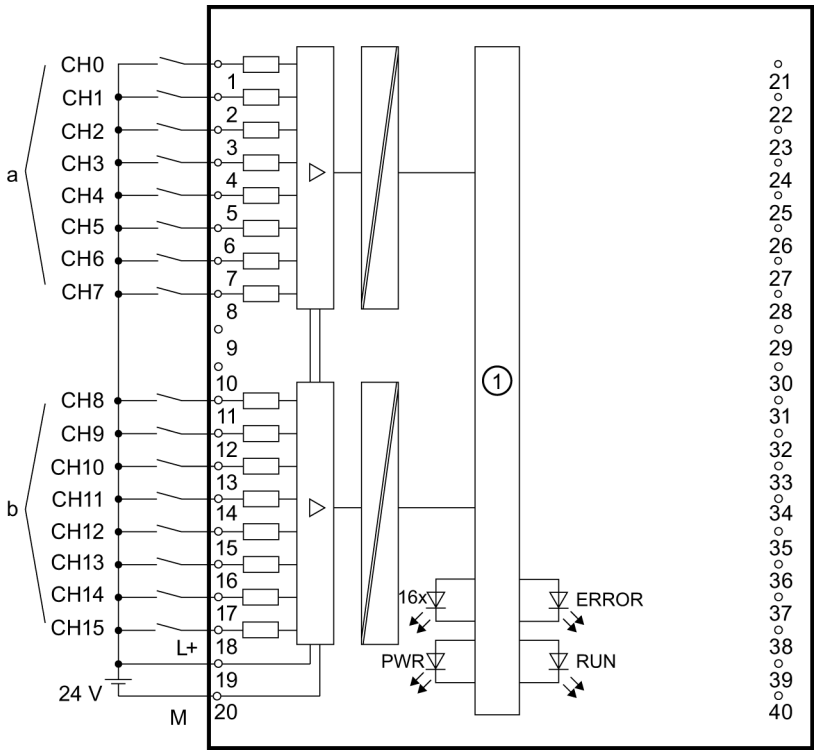
Abbreviations used

Meaning of the abbreviations used in the following figures:

L+	Supply voltage connection
M	Ground connection
CHx	Channel or display of the channel status
PWR	Display for the supply voltage (POWER)

Wiring and block diagrams

The figure below shows you how to connect the module and channel addressing (input byte a to input byte b).



① Backplane bus interface

Figure 3-1 Block diagram and terminal assignment

Resistor circuitry of the encoders

To detect a wire break, it is necessary that enough quiescent current is flowing even when the encoder contacts are open. Connect a resistor of 25 kΩ to 45 kΩ with 0.25 W to the encoder contacts for this reason.

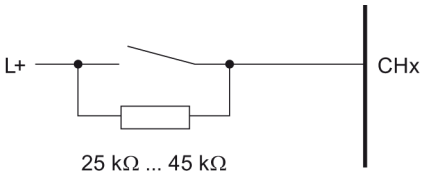


Figure 3-2 Resistor circuitry of the encoders

Tip: Using the potential jumpers

Use the potential jumpers supplied with the front connector if you want to distribute the 24V DC supply voltage to a neighboring module. This helps you to avoid having to terminate two wires to one terminal.

Proceed as follows:

1. Connect the 24 V DC supply voltage to terminals 19 and 20.
2. Insert the potential jumpers between terminals 19 and 39 (L+) and between terminals 20 and 40 (M).
3. Use the terminals 39 and 40 to distribute the potential to the next module

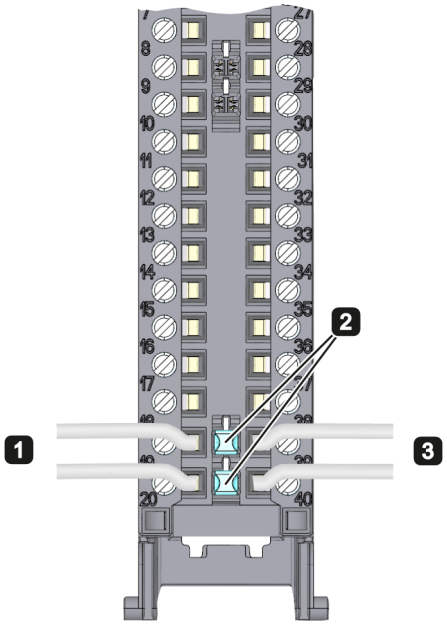


Figure 3-3 Using the potential jumpers

Note

Ensure that the maximum current load of 8 A per potential jumper is not exceeded.

Parameters/address space

4

4.1 Parameters

DI 16x24VDC HF parameters

When you assign the module parameters in STEP 7, you use various parameters to specify the module properties. The following table lists the configurable parameters. The effective range of the configurable parameters depends on the type of configuration. The following configurations are possible:

- Central operation with a S7-1500 CPU
- Distributed operation on PROFINET IO in an ET 200MP system
- Distributed operation on PROFIBUS DP in an ET 200MP system

For parameter assignment in the user program, the parameters are transferred to the module using the WRREC instruction (parameter reassignment in RUN) and data records; see chapter Parameter assignment and structure of the parameter data records (Page 31).

Table 4- 1 Configurable parameters and their defaults

Parameters	Range of values	Default	Parameter assignment in RUN	Scope with configuration software, e.g., STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP
Diagnostics					
• Missing supply voltage L+	Yes/No	No	Yes	Channel*	Channel group**
• Wire break	Yes/No	No	Yes	Channel	Channel group**
Input delay	0.05 ms, 0.1 ms, 0.4 ms, 1.6 ms, 3.2 ms, 12.8 ms, 20 ms	3.2 ms; for isochronous mode 0.05 ms (cannot be changed)	Yes	Channel	Channel group**

Parameters	Range of values	Default	Parameter assignment in RUN	Scope with configuration software, e.g., STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP
Hardware interrupt					
• Positive edge	Yes/No	No	Yes	Channel	Channel
• Negative edge	Yes/No	No	Yes	Channel	Channel
• Positive and negative edge	Yes/No	No	Yes	Channel	Channel

* If you enable diagnostics for multiple channels, you will receive an alarm surge on failure of the supply voltage because each enabled channel will detect this fault.

You can prevent this message burst by assigning the diagnostics function to one channel only.

** The scope can be assigned for each channel during parameter assignment in RUN.

4.2 Address space

The module can be configured differently in STEP 7; see following table. Depending on the configuration, additional/different addresses are assigned in the process image of the inputs.

The letters "a to d" are printed onto the module. "IB a" for example, stands for module start address input byte a.

Configuration options of DI 16x24VDC HF

You can configure the module with STEP 7 (TIA Portal) or with a GSD file.

When you configure the module by means of the GSD file, the configurations are available under different abbreviations/module names.

The following configurations are possible:

Table 4- 2 Configuration options

Configuration	Short designation/ module name in the GSD file	Configuration software, e.g., with STEP 7 (TIA Portal)	
		Integrated in hardware catalog STEP 7 (TIA Portal)	GSD file in STEP 7 (TIA Portal) V12 or higher or STEP 7 V5.5 SP3 or higher
1 x 16-channel without value status	DI 16x24VDC HF	V12 or higher	X
1 x 16-channel with value status	DI 16x24VDC HF QI	V12 or higher	X
2 x 8-channel without value status	DI 16x24VDC HF S	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)
2 x 8-channel with value status	DI 16x24VDC HF QI S	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)
1 x 16-channel with value status for module-internal shared input with up to 4 submodules	DI 16x24VDC HF MSI	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)

Value status (Quality Information, QI)

The value status is always activated for the following module names:

- DI 16x24VDC HF QI,
- DI 16x24VDC HF QI S
- DI 16x24VDC HF MSI

An additional bit is assigned to each channel for the value status. The value status bit indicates if the read in digital value is valid. (0 = value is incorrect).

Address space for configuration as 16-channel DI 16x24VDC HF

The following figure shows the assignment of the address space for the configuration as a 32-channel module with value status. You can freely assign the start address for the module. The addresses of the channels are derived from the start address.

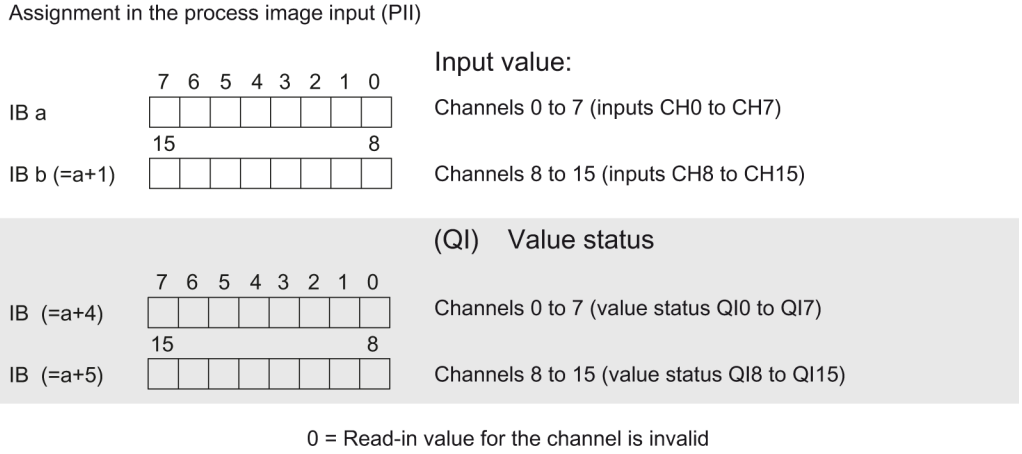

Assignment in the process image input (PII)
Input value:
7 6 5 4 3 2 1 0
IB a
Channels 0 to 7 (inputs CH0 to CH7)
15 8
IB b (=a+1)
Channels 8 to 15 (inputs CH8 to CH15)
(QI) Value status
7 6 5 4 3 2 1 0
IB (=a+4)
Channels 0 to 7 (value status QI0 to QI7)
15 8
IB (=a+5)
Channels 8 to 15 (value status QI8 to QI15)
0 = Read-in value for the channel is invalid

Figure 4-1 Address space for configuration as 16-channel DI 16x24VDC HF with value status

Address space for configuration as 2 x 8-channel DI 16x24VDC HF QI S

For the configuration as a 2 x 8-channel module, the channels of the module are divided into multiple submodules. The submodules can be assigned to different IO controllers when the module is used in a shared device.

The number of usable submodules is dependent on the interface module used. Observe the information in the manual for the particular interface module.

Contrary to the 1 x 16-channel module configuration, each of the two submodules has a freely assignable start address.

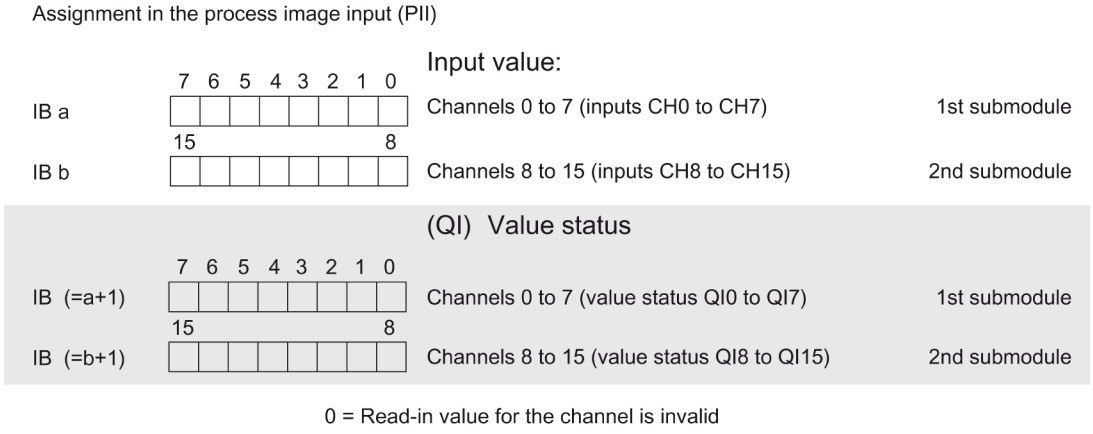

Assignment in the process image input (PII)
Input value:
7 6 5 4 3 2 1 0
IB a
Channels 0 to 7 (inputs CH0 to CH7)
1st submodule
15 8
IB b
Channels 8 to 15 (inputs CH8 to CH15)
2nd submodule
(QI) Value status
7 6 5 4 3 2 1 0
IB (=a+1)
Channels 0 to 7 (value status QI0 to QI7)
1st submodule
15 8
IB (=b+1)
Channels 8 to 15 (value status QI8 to QI15)
2nd submodule
0 = Read-in value for the channel is invalid

Figure 4-2 Address space for configuration as 2 x 8-channel DI 16x24VDC HF QI S

Address space for configuration as 1 x 16-channel DI 16x24VDC HF MSI

The channels 0 to 15 of the module are copied in up to four submodules with configuration 1 x 16-channel module (Module-internal shared input, MSI). Channels 0 to 15 are then available with identical input values in different submodules. These submodules can be assigned to up to four IO controllers when the module is used in a shared device. Each IO controller has read access to the same channels.

The number of usable submodules is dependent on the interface module used. Please observe the information in the manual for the particular interface module.

Value status (Quality Information, QI)

The meaning of the value status depends on the submodule on which it occurs.

For the first submodule (=basic submodule), the value status 0 indicates that the value is incorrect.

For the 2nd to 4th submodule (=MSI submodule), the value status 0 indicates that the value is incorrect or the basic submodule has not yet been configured (not ready).

The following figure shows the assignment of the address space with submodules 1 and 2 and the value status.

Assignment in the process image input (PII) for 1st and 2nd submodules

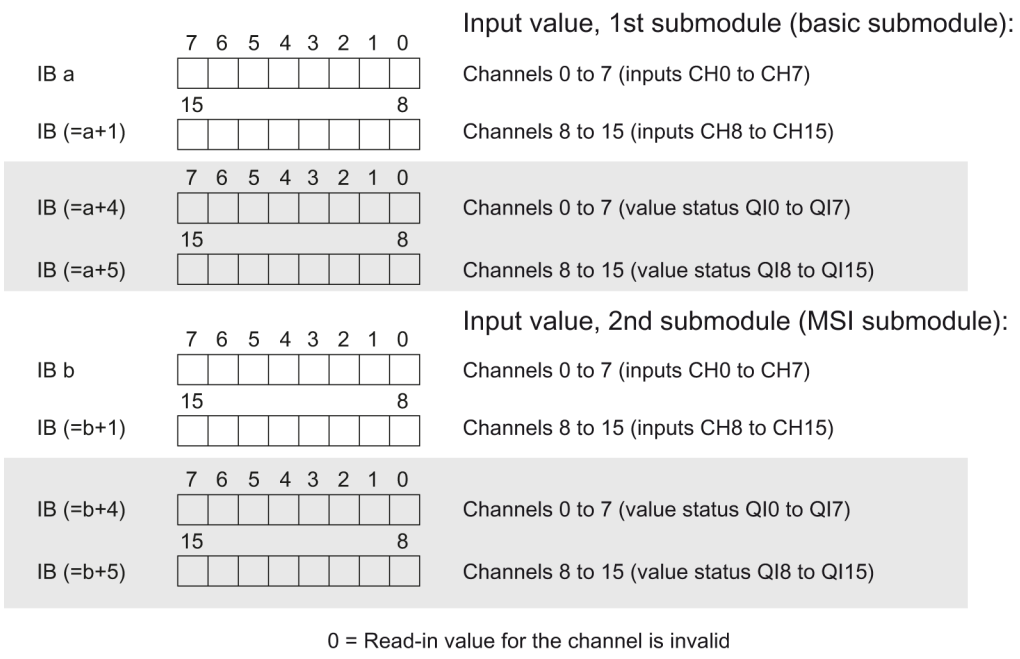

Input value, 1st submodule (basic submodule):
7 6 5 4 3 2 1 0
IB a
Channels 0 to 7 (inputs CH0 to CH7)
15 8
IB (=a+1)
Channels 8 to 15 (inputs CH8 to CH15)
7 6 5 4 3 2 1 0
IB (=a+4)
Channels 0 to 7 (value status QI0 to QI7)
15 8
IB (=a+5)
Channels 8 to 15 (value status QI8 to QI15)
Input value, 2nd submodule (MSI submodule):
7 6 5 4 3 2 1 0
IB b
Channels 0 to 7 (inputs CH0 to CH7)
15 8
IB (=b+1)
Channels 8 to 15 (inputs CH8 to CH15)
7 6 5 4 3 2 1 0
IB (=b+4)
Channels 0 to 7 (value status QI0 to QI7)
15 8
IB (=b+5)
Channels 8 to 15 (value status QI8 to QI15)
0 = Read-in value for the channel is invalid

Figure 4-3 Address space for configuration as 1 x 16-channel DI 16x24VDC HF MSI

The following figure shows the assignment of the address space with submodules 3 and 4 and the value status.

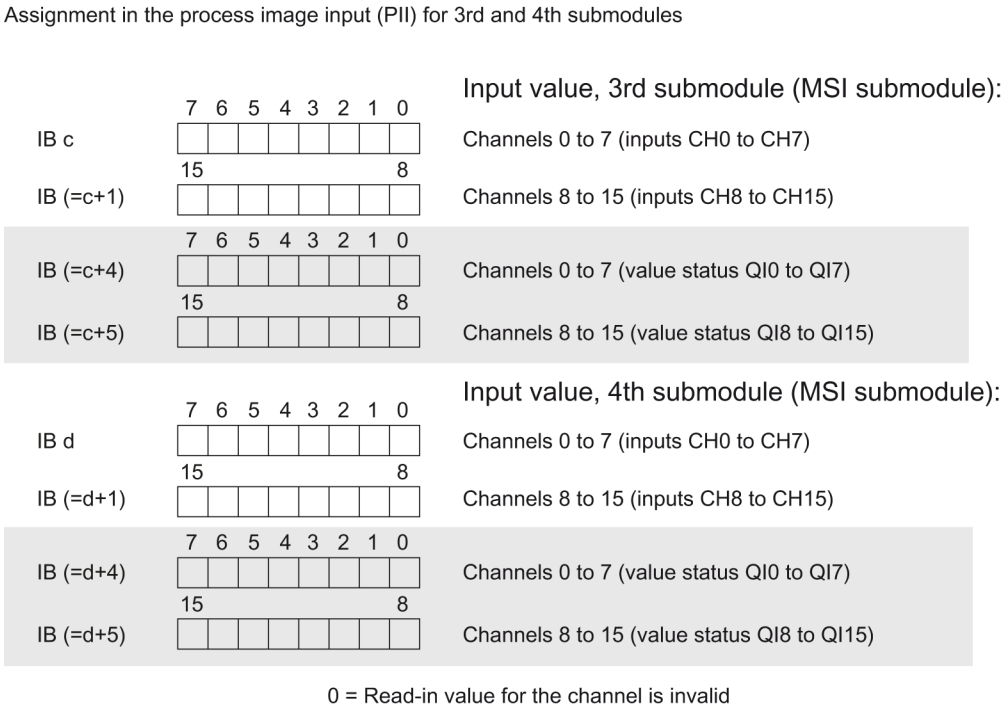

Assignment in the process image input (PII) for 3rd and 4th submodules
Input value, 3rd submodule (MSI submodule):
7 6 5 4 3 2 1 0
IB c
Channels 0 to 7 (inputs CH0 to CH7)
15 8
IB (=c+1)
Channels 8 to 15 (inputs CH8 to CH15)
7 6 5 4 3 2 1 0
IB (=c+4)
Channels 0 to 7 (value status QI0 to QI7)
15 8
IB (=c+5)
Channels 8 to 15 (value status QI8 to QI15)
Input value, 4th submodule (MSI submodule):
7 6 5 4 3 2 1 0
IB d
Channels 0 to 7 (inputs CH0 to CH7)
15 8
IB (=d+1)
Channels 8 to 15 (inputs CH8 to CH15)
7 6 5 4 3 2 1 0
IB (=d+4)
Channels 0 to 7 (value status QI0 to QI7)
15 8
IB (=d+5)
Channels 8 to 15 (value status QI8 to QI15)
0 = Read-in value for the channel is invalid

Figure 4-4 Address space for configuration as 1 x 16-channel DI 16x24VDC HF MSI

Interrupts/diagnostics alarms

5

5.1 Status and error displays

LED displays

The following figure shows the LED displays (status and error displays) of DI 16x24VDC HF.

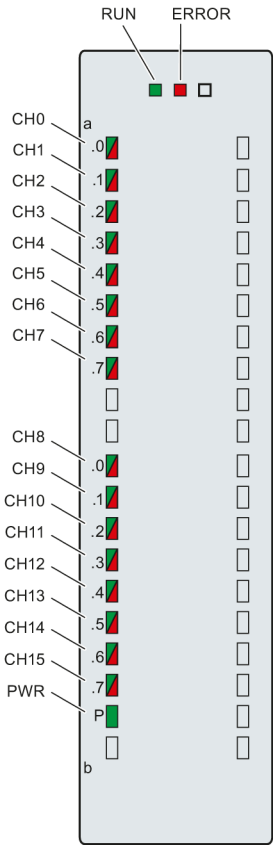


Figure 5-1 LED displays of the module DI 16x24VDC HF

Meaning of the LED displays

The following tables explain the meaning of the status and error displays. Remedial measures for diagnostic reports can be found in chapter Diagnostics alarms (Page 24).

RUN and ERROR LED

Table 5- 1 Status and error displays RUN and ERROR

LED		Meaning	Remedy
RUN	ERROR		
□ Off	□ Off	Voltage missing or too low at backplane bus	• Switch on the CPU and/or the system power supply modules. • Verify that the U connectors are inserted. • Check to see if too many modules are inserted.
☼ Flashes	□ Off	The module starts and flashes until the valid parameter assignment is set.	---
■ On	□ Off	Module is configured	
■ On	☼ Flashes	Indicates module errors (at least one error at one channel, e.g., wire break).	Evaluate the diagnostics data and eliminate the error (e.g., wire break).
☼ Flashes	☼ Flashes	Hardware defective	Replace the module.

PWR LED

Table 5- 2 PWR status display

LED PWR	Meaning	Remedy
□ Off	Supply voltage L+ too low or missing	Check supply voltage L+.
■ On	Supply voltage L+ is present and OK	---

CHx LED

Table 5- 3 CHx status display

LED CHx	Meaning	Remedy
□ Off	0 = Status of the input signal	---
■ On	1 = Status of the input signal	---
■ On	Diagnostics: Wire break	Check the wiring. When using simple switches, deactivate diagnostics or connect a resistor (25 kΩ … 45 kΩ) to the encoder contacts.
	Supply voltage L+ too low or missing	Check supply voltage L+.

5.2 Interrupts

Digital input module DI 16x24VDC HF supports diagnostic and hardware interrupts.

Diagnostic interrupt

The module generates a diagnostic interrupt at the following events:

- Missing supply voltage L+
- Wire break

Hardware interrupt

The module generates a hardware interrupt at the following events:

- Positive edge
- Negative edge
- Positive and negative edge

For detailed information on the error event, refer to the hardware interrupt organization block with the "RALRM" instruction (read additional interrupt information) and to the STEP 7 online help.

The module channel that triggered the hardware interrupt is entered in the start information of the organization block. The following figure shows the assignment to the bits of double word 8 in local data.

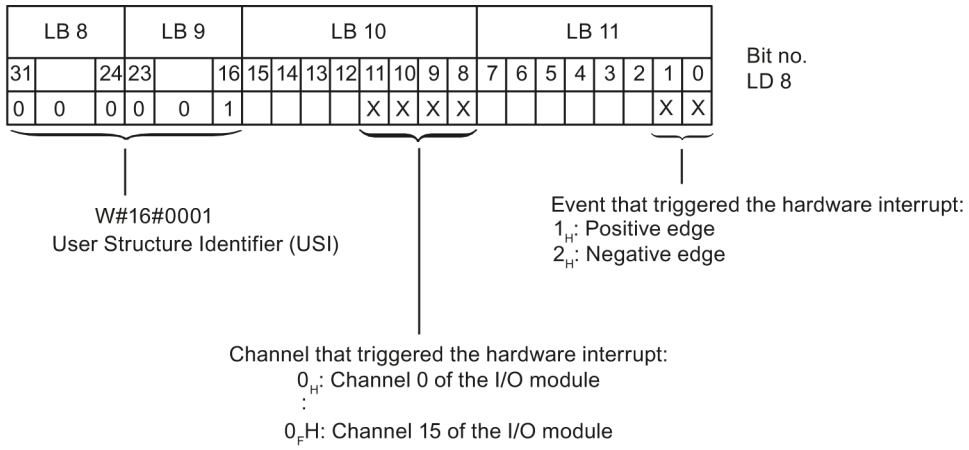

LB 8
LB 9
LB 10
LB 11
31 24 23 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
0 0 0 0 0 1 X X X X X X
Bit no.
LD 8
W#16#0001
User Structure Identifier (USI)
Event that triggered the hardware interrupt:
1H: Positive edge
2H: Negative edge
Channel that triggered the hardware interrupt:
0H: Channel 0 of the I/O module
:
0FH: Channel 15 of the I/O module

Figure 5-2 OB start information

Structure of the additional interrupt information

Table 5- 4 Structure of USI = W#16#0001

Data block name		Contents	Comment	Bytes
USI (User Structure Identifier)		W#16#0001	Additional interrupt info for hardware interrupts of the I/O module	2
The channel that triggered the hardware interrupt follows.				
	Channel	B#16#00 to B#16#0F	Number of the event-triggering channel (channel 0 to channel 15 of the module)	1
It follows the error event that triggered the hardware interrupt.				
	Event	B#16#01	Positive edge	1
		B#16#02	Negative edge	

5.3 Diagnostics alarms

Diagnostics alarms

A diagnostics alarm is output for each diagnostics event and the ERROR LED flashes on the module. The diagnostics alarms can, for example, be read from the diagnostics buffer of the CPU. You can evaluate the error codes with the user program.

If the module is operated distributed with PROFIBUS DP in an ET 200MP system, you have the option to read out diagnostics data with the instruction RDREC or RD_REC using data record 0 and 1. The structure of the data records is available on the Internet in the "Manual for interface module IM 155-5 DP ST (6ES7155-5BA00-0AB0)".

Table 5- 5 Diagnostics alarms, their meaning and corrective measures

Diagnostics alarm	Error code	Meaning	Corrective measures
Wire break	6_H	Impedance of encoder circuit too high	Use a different encoder type or modify the wiring, for example, using cables with larger cross-section
		Wire break between the module and sensor	Connect the cable
		Channel not connected (open)	• Disable diagnostics • Connect a resistor of 25 kΩ to 45 kΩ to the encoder contacts
Load voltage missing	11_H	Supply voltage L+ of the module is missing	Connect supply voltage L+ to module/channel
Hardware interrupt lost	16_H	The module cannot trigger an interrupt because the previous interrupt was not acknowledged; possibly a configuration error	• Change interrupt processing in the CPU and, if necessary, edit the module parameters. • The error persists until the module is assigned new parameters

Technical specifications

6

Technical specifications of the DI 16x24VDC HF

	6ES7521-1BH00-0AB0
Product type designation	DI 16x24VDC HF
General information	
Hardware version	E01
Firmware version	V2.0.0
Product function	
I&M data	Yes; IM0 to IM3
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V12.0 / V12.0
STEP 7 can be configured/integrated as of version	as of V5.5 SP3 / -
Operating mode	
MSI	Yes
Supply voltage	
Type of supply voltage	DC
Rated value (DC)	24 V
Valid range, low limit (DC)	20.4 V
Valid range, high limit (DC)	28.8 V
Reverse polarity protection	Yes
Input current	
Current consumption, max.	20 mA; (with 24 V DC supply)
Power	
Power consumption from the backplane bus	1.1 W
Power loss	
Power loss, typ.	2.6 W
Digital inputs	
Number of inputs	16
reading m/p	reading p
Input characteristic curve acc. to IEC 61131, type 3	Yes
Input voltage	
Type of input voltage	DC
Rated value, DC	24 V
for signal "0"	-30 to +5 V
for signal "1"	11 to 30 V
Permissible voltage at input, max.	30 V
Permissible voltage at input, min.	-30 V

	6ES7521-1BH00-0AB0
Input current	
for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage)	
For standard inputs	
• Configurable	Yes; 0.05 / 0.1 / 0.4 / 1.6 / 3.2 / 12.8 / 20 ms
• with "0" to "1", min.	0.05 ms
• with "0" to "1", max.	20 ms
• with "1" to "0", min.	0.05 ms
• with "1" to "0", max.	20 ms
For interrupt inputs	
• Configurable	Yes
Cable length	
Cable length shielded, max.	1000 m
Cable length unshielded, max.	600 m
Encoders	
Connectable encoders	
2-wire sensor	Yes
• Permissible quiescent current (2-wire sensor), max.	1.5 mA
Isochronous mode	
Isochronous mode (application synchronized up to terminal)	Yes
Filtering and processing time (TCI), min.	80 µs; with 50 µs filter time
Bus cycle time (TDP), min.	250 µs
Interrupts/diagnostics/status information	
Interrupts	
Diagnostics interrupt	Yes
Hardware interrupt	Yes
Diagnostics alarms	
Diagnostics	Yes
Monitoring of supply voltage	Yes
Wire break	Yes; to I < 350 µA
Short-circuit	No
Fuse blown	No
Diagnostics indicator LED	
RUN LED	Yes; green LED
ERROR LED	Yes; red LED
Monitoring of supply voltage	Yes; green LED
Channel status display	Yes; green LED
For channel diagnostics	Yes; red LED
For module diagnostics	Yes; red LED

	6ES7521-1BH00-0AB0
Electrical isolation	
Electrical isolation of channels	
Between the channels	No
Between the channels, in groups of	16
Between the channels and the backplane bus	Yes
Between the channels and the supply voltage of the electronics	No
Permitted potential difference	
Between different circuits	75 V DC / 60 V AC (basic isolation)
Isolation	
Isolation tested with	707 V DC (type test)
Distributed mode	
Prioritized startup	Yes
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	240 g

Tolerances of the programmable input delay

Table 6- 1 Tolerances of the programmable input delay

Input delay	Tolerance range
0.05 ms	43 µs to 57 µs
0.1 ms	86 µs to 114 µs
0.4 ms	344 µs to 456 µs
1.6 ms	1.5 ms to 1.9 ms
3.2 ms (preset)	3 ms to 4 ms
12.8 ms	12 ms to 15 ms
20 ms	19 ms to 23 ms

Dimensional drawing

A

The dimensional drawing of the module on the mounting rail, as well as a dimensional drawing with open front cover, are provided in the appendix. Always observe the specified dimensions for installation in cabinets, control rooms, etc.

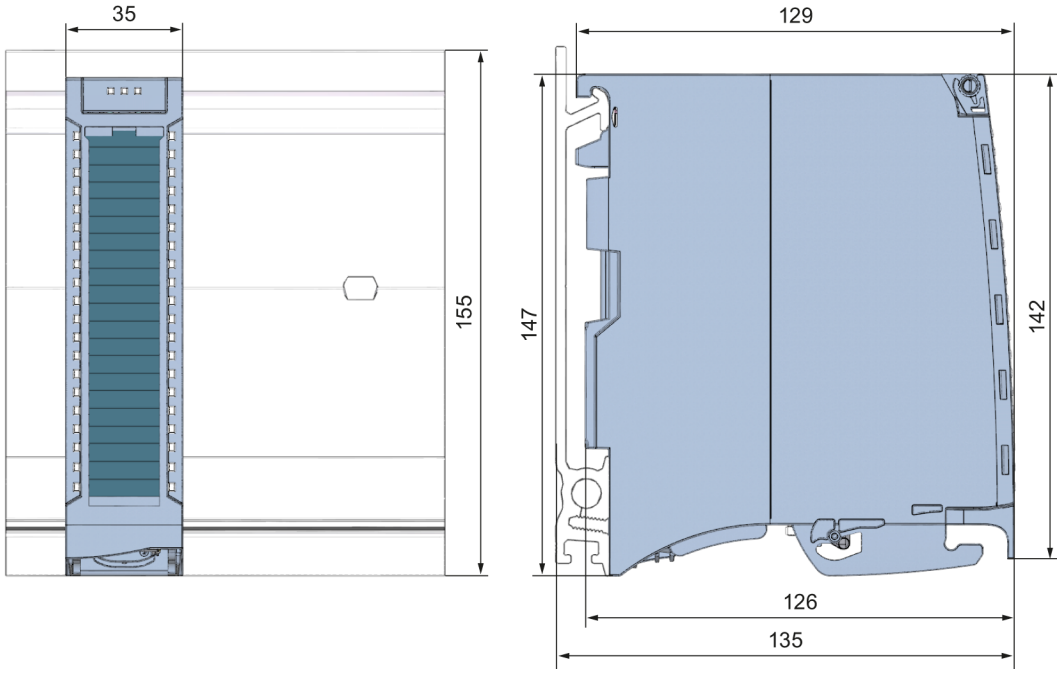


Figure A-1 Dimensional drawing of the DI 16x24VDC HF module

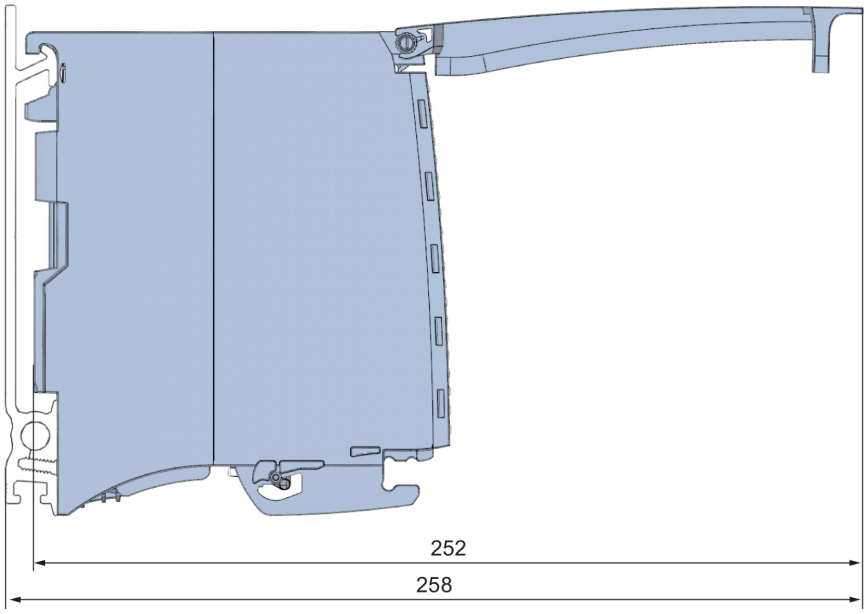


Figure A-2 Dimensional drawing of the DI 16x24VDC HF module, side view with open front cover

Parameter data records

B

B.1 Parameter assignment and structure of the parameter data records

The data records of the module have an identical structure, regardless of whether you configure the module with PROFIBUS DP or PROFINET IO.

Dependencies for configuration with GSD file

When a GSD file is used to configure a module, dependencies can arise when "assigning the parameters".

There are no dependencies for this module. You can assign the individual parameters in any combination.

Parameter assignment in the user program

You have the option to reconfigure the module in RUN (e.g. the input delay values of selected channels can be edited without having an effect on the other channels).

Parameter assignment in RUN

The WRREC instruction is used to transfer the parameters to the module using data records 0 to 15. The parameters set in STEP 7 do not change in the CPU, which means the parameters set in STEP 7 are still valid after a restart.

The parameters are only checked for plausibility by the module after the transfer.

Output parameter STATUS

The module ignores errors that occurred during the transfer of parameters with the WRREC instruction and continues operation with the previous parameter assignment. However, a corresponding error code is written to the STATUS output parameter.

The description of the WRREC instruction and the error codes is available in the STEP 7 online help.

Operation of the module behind a PROFIBUS DP interface module

If the module is operated behind a PROFIBUS DP interface module, the parameter data records 0 and 1 are not read back. You get the diagnostics data records 0 and 1 for the read back parameter data records 0 and 1. You can find more information in the Interrupts section of the PROFIBUS DP interface module device manual on the Internet (http://support.automation.siemens.com/WW/view/en/78324181).

Assignment of data record and channel

For the configuration as a 1 x 16-channel module, the parameters are located in data records 0 to 15 and are assigned as follows:

- Data record 0 for channel 0
- Data record 1 for channel 1
- …
- Data record 14 for channel 14
- Data record 15 for channel 15

For the configuration as a 2 x 8-channel module, the module has 2 submodules with eight channels each. The parameters for the channels are located in data records 0 to 7 and are assigned as follows:

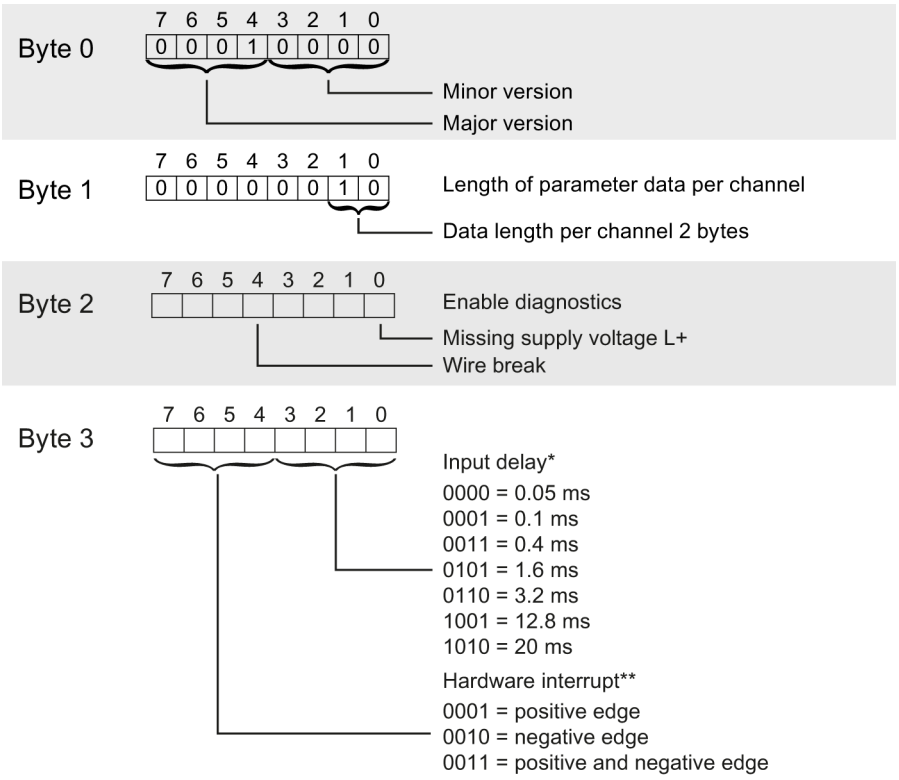
- Data records 0 to 7 for channels 0 to 7 (submodule 1)
- Data records 0 to 7 for channels 8 to 15 (submodule 2)

Address the respective submodule for data record transfer.

Data record structure

The example in the following figure shows the structure of data record 0 for channel 0. The structure of channels 1 to 15 is identical. The values in byte 0 and byte 1 are fixed and may not be changed.

Enable a parameter by setting the corresponding bit to "1".


Byte 0
7 6 5 4 3 2 1 0
0 0 0 1 0 0 0 0
Minor version
Major version
Byte 1
7 6 5 4 3 2 1 0
0 0 0 0 0 0 1 0
Length of parameter data per channel
Data length per channel 2 bytes
Byte 2
7 6 5 4 3 2 1 0
Enable diagnostics
Missing supply voltage L+
Wire break
Byte 3
7 6 5 4 3 2 1 0
Input delay*
0000 = 0.05 ms
0001 = 0.1 ms
0011 = 0.4 ms
0101 = 1.6 ms
0110 = 3.2 ms
1001 = 12.8 ms
1010 = 20 ms
Hardware interrupt**
0001 = positive edge
0010 = negative edge
0011 = positive and negative edge

* For isochronous mode 0.05 ms (cannot be changed)

** Hardware interrupts can only be activated using the data record if a hardware interrupt OB is assigned to the channel in STEP 7

Figure B-1 Structure of data record 0: Bytes 0 to 3

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C

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